Report on

WATER POLLUTION SURVEY

of the

ST.LAWRENCE RIVER

from

CARDINAL TO MORRISBURG

BY

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DATE

May 31st to June 2nd

1960

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Counties of Grenville and Dundas

INTRODUCTION

A survey was conducted by Commission staff during the period of May 31st to June 2nd, 1960, to examine the sanitary chemical and bacteriological qualities of the waters in the St. Lawrence River from the Village of Cardinal downstream to the Village of Morrisburg. These investigations were prompted by a request from Dr. P. S. deGrosbois, M.O.H. and Director, Stormont, Dundas and Glengarry Health Unit, and subsequent to reported indications of adverse water quality at Morrisburg's municipal water works. This survey was pertinent to the incorporated municipalities of Cardinal, Iroquois and Morrisburg, which employ the St. Lawrence River as a source of municipal water supply, and as a receiving water for the effluents from their municipal sewage treatment plants.

Samples were collected at appropriate locations on June 1st and June 2nd, 1960, to assist in locating areas of pollution and to reveal the general sanitary quality of the river.

In conjunction with these investigations, inspections of the municipal water works and sewage disposal facilities employed at Cardinal, Iroquois and Morrisburg, were made and reports prepared by Mr. P. G. Cockburn, P. Eng., of this

Commission.

GENERAL

The co-operation which was received from the Village of Morrisburg officials, from members of the Stormont, Dundas and Glengarry Health Unit staff, and from members of the Leeds and Grenville Health Unit staff, is appreciated.

Water Uses

Municipal use of this section of the St. Lawrence River is important with respect to municipal water supplies and sewage disposal. Cardinal, Iroquois and Morrisburg draw their water supplies from the river. Effluents from the sewage treatment plants as well as from systems of combined sewers and storm sewers employed by these municipalities are discharged to the river. The following treatment facilities are provided:

Cardinal

Water - filtration and chlorination.

Sewage - sedimentation.

Iroquois

Water - chlorination.

Sewage - sedimentation and chlorination.

Morrisburg

Water - screening and chlorination.

Sewage - sedimentation and chlorination.

Recreational use of this section of the river is

of importance with respect to swimming areas. Periodic water samples are collected from the bathing waters at Iroquois and Morrisburg by members of the Stormont, Dundas and Glengarry Health Unit staff. The laboratory tests have indicated the occasional incidence of adverse bacteriological qualities in these waters.

Sampling Procedure

Locations of sampling points are shown on the appended map of the pertinent section of the St. Lawrence River. These locations were selected to provide information on the quality of the waters as they progressed downstream. "Grab" samples were collected: forty (40) ounce samples being used for sanitary chemical analysis, and six (6) ounce samples for bacteriological analyses. Tests were conducted at the Ontario Water Resources Commission laboratory, Toronto. The laboratory results are appended to this report.

The most common analyses of sanitary significance are: Biochemical Oxygen Demand, Suspended Solids, and the bacteriological determination expressed either as a Total Coliform Count (Indicated Number) or as a Membrane Filter Coliform Count. For the purpose of this report, bacteriological analyses were determined by the membrane filter technique.

Biochemical Oxygen Demand (B.O.D.)

The B.O.D. of sewage, sewage effluent, polluted

waters or industrial wastes is the oxygen required during stabilization (natural purification in a stream) of the decomposable organic matter or chemical material by aerobic biochemical action. Unless otherwise noted, a five-day B.O.D. determination is reported. A high B.O.D. is indicative of organic or chemical pollution. A desirable upper limit in natural water commonly is four (4) parts per million.

Suspended Solids

These results are reported in parts per million and indicate the measure of undissolved solids of organic or inorganic nature. Where suspended solids values approach 20 parts per million or less, laboratory difficulties usually result in these values being determined as turbidity and are reported in silica units.

Membrane Filter Coliform Count

The membrane filter technique is employed to obtain a direct enumeration of coliform organisms and is reported per 100 millilitres. A membrane filter coliform count in excess of the desirable upper limit of 2,400 organisms is considered to render the waters undesirable for municipal water supplies and bathing purposes.

Sampling Programme

"Grab" samples were collected from the waters of the St. Lawrence River and the Galop Canal at locations as

shown on the appended map of the "St. Lawrence River from Cardinal to Morrisburg". Samples were collected on June 1st at locations downstream from Iroquois, and were repeated on June 2nd. Sampling related to sections of the river lying upstream from Iroquois was conducted only on June 2nd. Periods of heavy precipitation on June 1st made the collecting of samples somewhat difficult.

Samples were collected at a depth of one (1) to two (2) feet below the surface of the water.

Sampling Conditions

Stream conditions may have been affected by the heavy precipitation which occurred on May 31st, and which continued intermittently on June 1st.

Information obtained from the Ceimatology Section, Meteorological Division, Department of Transport, revealed the following weather and wind conditions in the general Morrisburg area as reported by local observers and by the nearest official meteorological station at Dorval, P.Q.:

Date 1960	Weather Summary	Wind Direction	Wind Velocity (in miles per hour)
June 1st	Thunderstorm in A.M. Clearing in early P.M. Approx. 0.13 inches of precipation in late p.m.	South	5
June 2nd	Sunny and Warm	East	6

Strong undercurrents in the St. Lawrence River at Cardinal were observed during the sampling programme.

SAMPLING RESULTS

The laboratory results indicated that the sanitary chemical and bacteriological qualities of the waters in this section of the St. Lawrence River and the new Galop Canal were within reasonable limits at the time of sampling on June 1st and 2nd, 1960. Limited variations in water quality were revealed, except immediately downstream from Iroquois and Morrisburg where slight increases in five-day B.O.D. were indicated, yet were within acceptable limits. These notable increases in five-day B.O.D. may be attributed to the discharging of untreated or inadequately treated sanitary wastes to the river from Iroquois and Morrisburg where overflows from sanitary sewer systems, as well as the flows from combined sewer outlets, were resulting, in part, from the recent periods of heavy rainfall and the associated run-off.

SUMMARY

Samples were collected on June 1st and 2nd, 1960, from the waters of the St. Lawrence River and the new Galop Canal from Cardinal downstream to Morrisburg. The laboratory results revealed that the sanitary chemical and bacteriological qualities of these waters were within acceptable limits at the times of sampling. Negligible increases in five-day B.O.D. were indicated in samples collected from the river immediately downstream from Cardinal and Iroquois.

Detailed information with respect to the municipal water works and sewage treatment plants serving Cardinal, Iroquois and Morrisburg, may be obtained by referring to the reports on the recent inspections thereof by Mr. P. G. Cockburn of this Commission.

Prepared by: R. Barrens

Supervised by: G. Kay

G. M. Galimbert, Director
Division of Sanitary Engineering

ONTARIO WATER RESOURCES COMMISSION
CHEMICAL LABORATORIES

All analyses except pH reported in p.p.m. unless otherwise indicated

RIVER SURVEY

1 p.p.m. = 1 mgm. / litre = 1 lb./100,000 Imp. Gals.

Watershed: Report to: c.c.

Watercourse: St. Lawrence River

Date Sampled: See Below by: R. Barrens & C. D. McIntyre

Sample Point No.	Date of Sample 1960	Lab. No.	5-Day B.O.D.	Solids			D.O.	Sample Temp. C	Turbidity in Silica Units		Bacteriological Laboratory	
				Total	Susp.	Diss.					Lab. No.	M.F. Coliform Count per 100 ml.
1	June 1st	R-525	1.7	200					8		R-2213	430
	June 2nd	R-548	1.1	166					9		R-2297	6
2	June 1st	R-526	0.9	170					6		R-2214	670
	June 2nd	R-549	4.0	160					6		R-2298	1
3	June 1st	R-527	1.1	170					4		R-2215	10
	June 2nd	R-550	0.7	160					3		R-2299	30
4	June 1st	R-528	1.2	178					3		R-2216	less than 150
	June 2nd	R-551	0.6	158					5		R-2300	3
5	June 1st	R-529	1.1	166					3		R-2217	214
	June 2nd	R-552	0.7	156					4		R-2301	3

1)
2)
3) St. Lawrence River Downstream from Morrisburg - Numbered from
4) North to South
5)

4500-59-4522

ONTARIO WATER RESOURCES COMMISSION
CHEMICAL LABORATORIES

All analyses except pH reported in p.p.m. unless otherwise indicated **Continued.**

RIVER SURVEY

1 p.p.m. = 1 mgm. / litre = 1 lb./100,000 Imp. Gals.

Watershed: Report to: c.c.

Watercourse: **St. Lawrence River**

Date Sampled: by:

Date of Sample 1960	Lab. No.	5-Day B.O.D.	Solids			D.O.	Sample Temp. C	Turbidity in Silica Units	Bacteriological Laboratory	
			Total	Susp.	Diss.				Lab. No.	M.F. Coliform Count per 100 ml.
June 1st	R-520	1.0	168					6	R-2208	560
June 2nd	Sample	Broken	in Transit						R-2292	4
June 1st	R-521								R-2209	240
June 2nd	R-544	1.7	166					6	R-2293	1
June 1st	R-522	1.2	172					9	R-2210	600
June 2nd	R-545	1.1	184					5	R-2294	1
June 1st	R-523	1.1	196					9	R-2211	970
June 2nd	R-546	1.0	186					5	R-2295	3,400
June 1st	R-524	1.1	180					7	R-2212	310
June 2nd	R-547	0.9	172					5	R-2296	297

6)
7)
8) St. Lawrence River Upstream from Morrisburg - Numbered from South to North.
9)
10)

ONTARIO WATER RESOURCES COMMISSION
CHEMICAL LABORATORIES

All analyses except pH reported in p.p.m. unless otherwise indicated **Continued.**

RIVER SURVEY

1 p.p.m. = 1 mgm. / litre = 1 lb./100,000 Imp. Gals.

Watershed: Report to: c.c.

Watercourse: **St. Lawrence River**

Date Sampled: **See Below** by: **R. Barrens & C. L. McIntyre**

Sample Point No.	Date of Index Rain Nux Sample 1960	Lab. No.	5-Day B.O.D.	Solids			D.O.	Sample Temp. C	Turbidity in Silica Units	Bacteriological Laboratory	
				Total	Susp.	Diss.				Lab. No.	M.F. Coliform Count per 100 ml.
11	June 1st	R-515	1.1	174					8	R-2204	500
	June 2nd	Sample Broken in Transit								R-2287	32
12	June 1st	R-516	0.9	180					11	R-2205	1,420
	June 2nd	R-540	0.8	182					5	R-2288	less than 15,000
13	June 1st	R-517	0.9	178					7	R-2206	1,060
	June 2nd	R-541	4.6	178					4	R-2289	200
14	June 1st	R-518	1.4	172					10	R-2207	420
	June 2nd	R-542	4.7	176					4	R-2290	2
15	June 1st	R-519	1.1	170					7	Broken in Transit	
	June 2nd	R-543	1.2	172					3	R-2291	1

11)

12)

13) St. Lawrence River Downstream from Iroquois - Numbered from North to South

14)

15)

ONTARIO WATER RESOURCES COMMISSION
CHEMICAL LABORATORIES

All analyses except pH reported in p.p.m. unless otherwise indicated

RIVER SURVEY

1 p.p.m. = 1 mgm. / litre = 1 lb./100,000 Imp. Gals.

Continued

Watershed:

Report to:

c.c.

Watercourse: St. Lawrence River

Date Sampled: June 2,1960 by: R. Barrena, J. Theil & C. E. McIntyre

Sample Point No.	Lab. No.	5-Day B.O.D.	Solids			D.O.	Sample Temp. C	Turbidity in Silica Units	Bacteriological Laboratory	
			Total	Susp.	Diss.				Lab. No.	M.F. Coliform Count per 100 ml.
16	R-553	0.9	144					6	R-2302	10
17	R-554	0.8	154					3	R-2303	1
18	R-555	0.9	164					3	R-2304	0
19	R-556	1.4	166					4	R-2305	less than 10
20	R-557	1.2	148					3	R-2306	71
21	R-558	2.4	146					3	R-2307	10
22	R-559	1.1	142					3	R-2308	175
23	R-560	1.6	156					3	R-2309	110
24	R-561	1.4	138					4	R-2310	0
25	R-562	1.7	154					3	R-2311	8

16)
17)
18) St. Lawrence River - Upstream from Iroquois.
19)
20)

21)
22)
23) St. Lawrence River - Downstream from Cardinal.
24)
25)

ONTARIO WATER RESOURCES COMMISSION
CHEMICAL LABORATORIES

All analyses except pH reported in p.p.m. unless otherwise indicated **Continued.**

RIVER SURVEY

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gals.

Watershed: Report to: c.c.

Watercourse: **St. Lawrence River**

Date Sampled: by:

Sample Point No.	Lab. No.	5-Day B.O.D.	Solids			D.O.	Sample Temp. C	Turbidity in Silica Units	Bacteriological Laboratory	
			Total	Susp.	Diss.				Lab. No.	M.F. Coliform Count per 100 ml.
26	2269	1.4	200	18	182				2327	18
27	R-563	1.4	154					3	R-2312	3
28	R-564	1.5	144					3	R-2313	4
29	R-565	1.2	152					3	R-2314	10
30	R-566	1.6	146					3	R-2315	31
31	R-567	1.3	140					3	R-2316	374

26) Entrance to Calop Canal - Just upstream from Cardinal
27)
28)
29) St. Lawrence River - Upstream from Cardinal.
30)
31)

4500-59-4522